

## Orthoptera (Saltatoria) of Iraklia island, Cyclades, Greece: An annotated and illustrated catalogue

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### ABSTRACT

A checklist of the Orthoptera of Iraklia Island is presented, with 20 species belonging in 19 genera and seven families collected during 2008–2016. The majority of the records are new to Iraklia. One species, *Arachnocephalus vestitus* Costa, 1855, is a new record for the Cyclades. The existence of *Mogoplistes brunneus* Serville, 1839 is confirmed in the Aegean archipelago. The range of the endemic *Poecilimon paros* Heller & Reinhold, 1992 is extended and now includes four islands in the Aegean Sea. Distribution maps of all the endemic and rare species are provided as well as photos of live and/or dead specimens.

KEYWORDS: Orthoptera, Aegean Sea, Cyclades, Iraklia, new records.

### ΠΕΡΙΛΗΨΗ

Μετά από εργασίες πεδίου στο νησί της Ηρακλείας στο Αιγαίο Πέλαγος κατά το διάστημα 2008–2016, καταγράφονται 20 είδη που κατατάσσονται σε 19 γένη και επτά οικογένειες. Οι περισσότερες από τις καταγραφές είναι νέες για την Ηρακλεία. Το είδος *Arachnocephalus vestitus* Costa, 1855 αποτελεί νέα αναφορά για τις Κυκλάδες. Το είδος *Mogoplistes brunneus* Serville, 1839 επιβεβαιώνεται για το Αιγαίο Πέλαγος. Η βιογεωγραφική κατανομή του ενδημικού *Poecilimon paros* Heller & Reinhold, 1992 διευρύνεται και πλέον περιλαμβάνει τέσσερα νησιά στο Αιγαίο. Επισυνάπτονται χάρτες κατανομής για όλα τα ενδημικά και σπάνια είδη καθώς και φωτογραφίες ατόμων in vivo ή δειγμάτων.

ΛΕΞΕΙΣ-ΚΛΕΙΔΙΑ: Ορθόπτερα, Αιγαίο Πέλαγος, Κυκλάδες, Ηρακλεία, νέες αναφορές.

### INTRODUCTION

Iraklia is one of the Cyclades Islands, located in the Central Aegean Sea, Greece (36°50'21"N 25°27'14"E). It lies south of Naxos Island (Fig. 1). It has an area of 18.1 km<sup>2</sup>, a maximum altitude of 418 m and its coastline is 29.2 km long. The climate is typical insular Mediterranean, characterized by calm and dry winters and cool summers. Precipitation is low and snowfall is very rare; the recorded absolute temperature values range from -2 °C to 38 °C. The island is protected within the Greek NATURA 2000 framework as part of the Site of Community Importance site GR4220013 (EUNIS 2017).

The habitat types on the inland include maquis, phrygana, abandoned terraces, caves and olive groves. Winter cultivations are xeric. The coastline comprises steep



cliffs, sandy beaches and rocky bays. Surface water is scarce; there are no perennial streams and there is a single seasonal wetland bordering the Livadi beach just east of the sole human settlement, Agios Georgios; other human settlements in the interior of the island are abandoned. The Livadi wetland only forms when there is torrential flow in winter or early spring.

The flora and fauna of the island have been a subject of research over 15 years. First results manifest an exceptionally rich biodiversity. There are more than 630 plant species identified so far (unpubl. data); the orchid flora alone comprises a minimum of 30 taxa (Antonopoulos *et al.* 2010). A checklist of the avifauna has been recently published (Gavalas 2014), confirming the presence of 172 bird species. Twenty-seven species of butterflies have been recorded in other studies (Gavalas 2013; Gavalas & Alexiou 2015).

Up to the moment, the Orthoptera fauna of Iraklia has been essentially unknown. The only records were presented by Werner (1934) who collected immatures of *Anadrymadusa cf. brevipennis* from 'Heraklia'. Following Willemse and Willemse (2008) on the known range of the species, Werner's records from Heraklia are considered as in need of confirmation.

#### MATERIALS AND METHODS

During 2008–2016, several sites on the island were repeatedly visited by the second author. The specimens were caught with an entomological net and/or by hand, or observed in the field and photographed. Pitfall traps were used at the Livadi wetland. Most collected specimens were pinned. One specimen of *Myrmecophilus ochraceus* was transferred to Thomas Stalling (Inzlingen, Germany) collection. The rest of the collection is shared between the first author's private collection and the Zoological Museum of the University of Athens. Specimens were identified using Willemse (1985b). The nomenclature follows Cigliano *et al.* (2016).

#### CHECKLIST

Order Orthoptera

Suborder Ensifera

Superfamily Tettigonioidea

Family Tettigoniidae Krauss, 1902

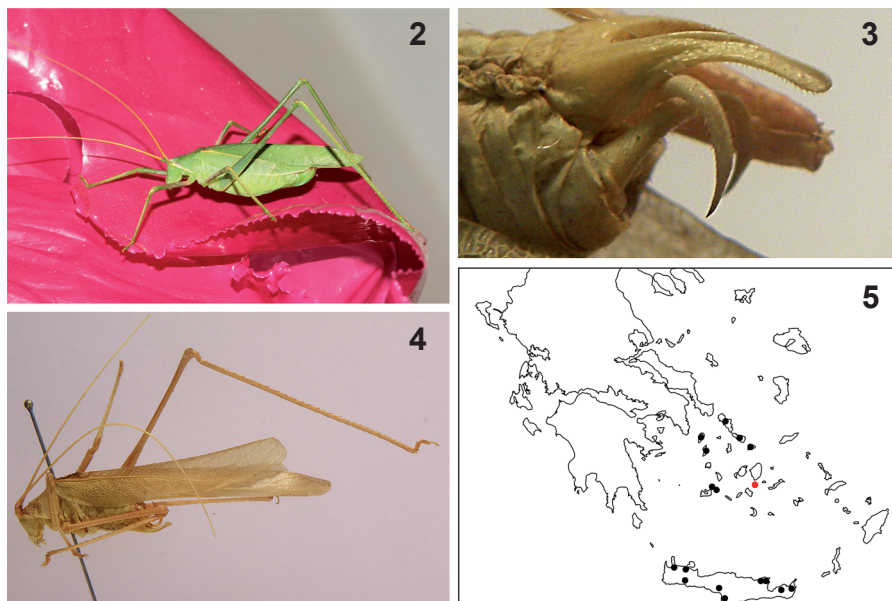
Subfamily Phaneropterinae Burmeister, 1838

1. *Acrometopa cretensis cretensis* Ramme, 1927

(Figs 2–5)

**Material examined:** 11.vi.2015, 1♂, 1♀ obs.

*Acrometopa cretensis* Ramme, 1927, is endemic to the South Aegean area. The nominate subspecies is known from Crete and West Cyclades (Kea, Kithnos, Andros, Tinos, Mykonos, Kimolos and Polýaigos). *Acrometopa c. daedali* Willemse, 1979 is endemic to Ikaria (Willemse 1979, 1984). Werner (1934) reported *Acrometopa c. cretensis* from Kea, Kimolos and Polýaigos; his additional records from the



**Figs 2–5:** *Acrometopa cretensis cretensis*, Greece, Cyclades, Iraklia, 11.vi.2015: (2) female; (3) male, lateral view of subgenital plate and cerci; (4) male, lateral view; (5) total known distribution (● – literature records, ● – new record).

islands of Ios, Kithnos, Andiparos and Sifnos were omitted by Willemse (1979, 1984), since they were based either on observations or on juvenile specimens. Willemse (1985a) added the island of Andros, and Willemse & Willemse (2008) added the islands of Tinos and Mykonos and confirmed Werner's report from Kithnos. This is the first confirmed record of *Acrometopa c. cretensis* from East Cyclades; the species was rarely encountered during field trips in Iraklia.

## 2. *Poecilimon paros* Heller & Reinhold, 1992

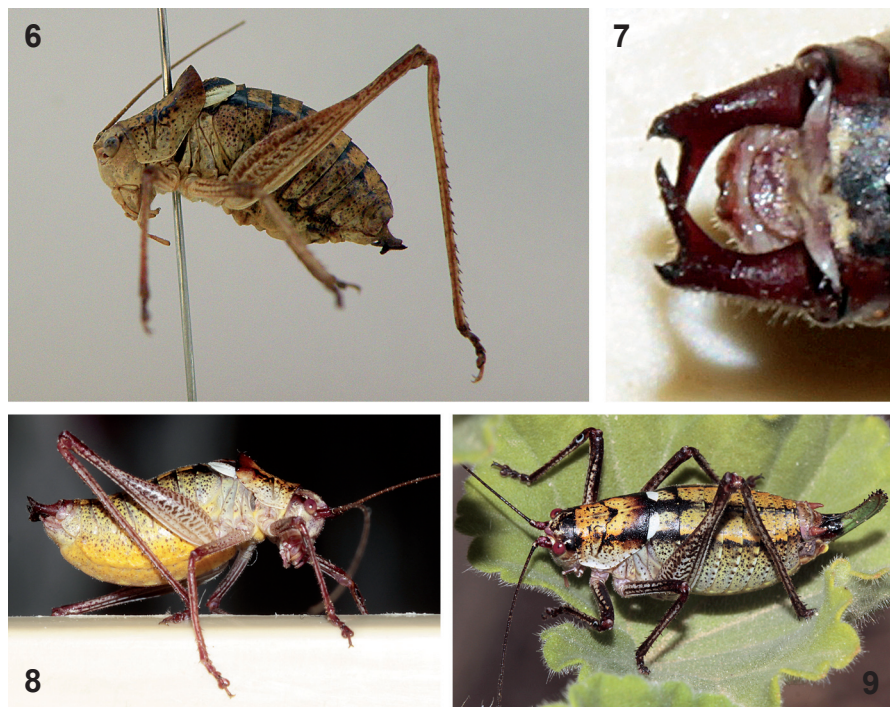
(Figs 6–10)

**Material examined:** 1.v.2012, 1♀; 29.v.2012, 1♂; v.2015, 1♂.

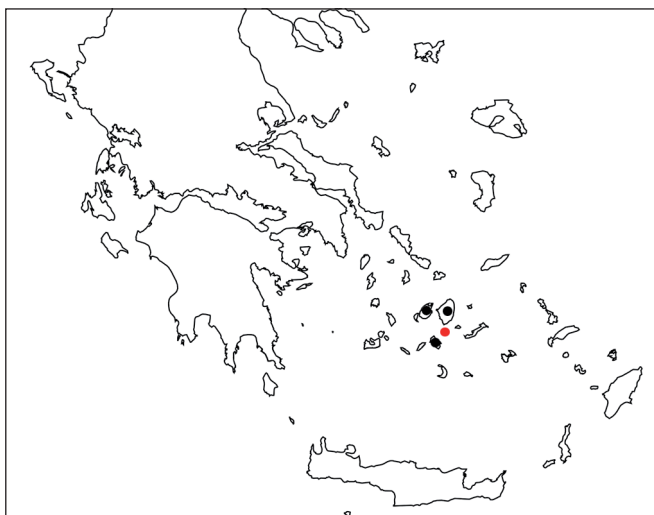
The East Mediterranean genus *Poecilimon* Fischer, 1853 is one of the most species-rich taxa of the Greek Orthoptera (Willemse 1984; Willemse & Willemse 2008). *Poecilimon paros* is endemic to the Cyclades, known so far from Paros, Naxos and Ios (Heller & Reinhold 1992; L. Willemse, pers. comm. 2016). It is morphologically similar and closely related to *P. klausgerhardi* Fontana, 2004, which is endemic to the islands of Andros and Tinos. Both *P. paros* and *P. klausgerhardi* are classified under the subgenus *Hamatopoecilimon* Heller, 2011, which is the basalmost lineage within the genus *Poecilimon* (Heller *et al.* 2011).

The species was an infrequent encounter in Iraklia. It is considered endangered in the IUCN European Red list (Hochkirch *et al.* 2016).

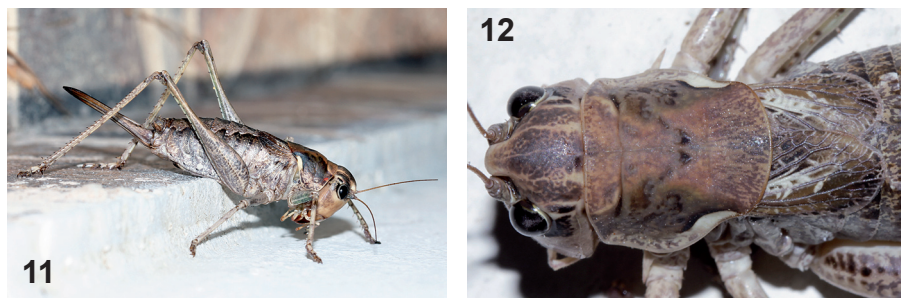




**Figs 6–9:** *Poecilimon paros*, Iraklia: (6) male, v.2015; (7) male, v.2015, terminalia, cerci; (8) male, 29.v.2012; (9) female, 1.v.2012.



**Fig. 10:** Total known distribution of *Poecilimon paros* (● – literature records, ● – new record).



**Figs 11, 12:** *Anadrymadusa cf. brevipennis*, female, Greece, Cyclades, Iraklia, 3.viii.2014: (11) general habitus; (12) pronotum and tegminae, dorsal view.

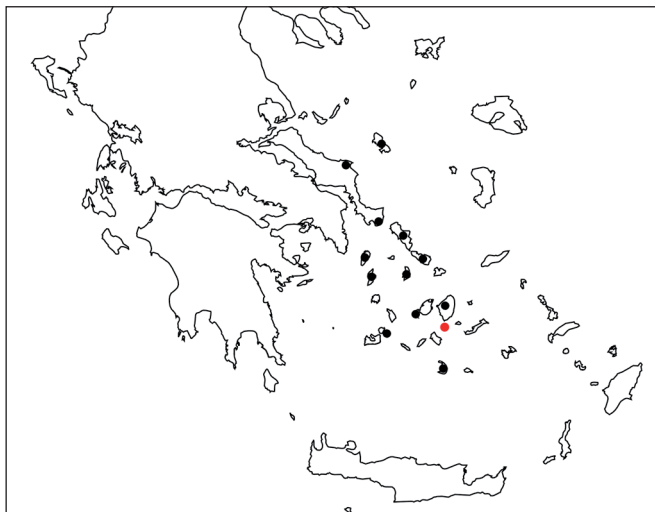
#### Subfamily Tettigoniinae Krauss, 1902

#### 3. *Anadrymadusa cf. brevipennis* (Brunner von Wattenwyl, 1882)

(Figs 11–13)

*Anadrymadusa* Karabağ, 1961 is an Asian genus reaching its westernmost distribution in the Aegean region (Karabağ 1961). Werner (1934) recorded *A. brevipennis* from Iraklia ('Heraclia'). However, his record was regarded as uncertain by Willemse (1984) and Willemse & Willemse (2008), because the specimens was juvenile. The record from Iraklia is based on photographic material so further confirmation is needed.

*Anadrymadusa brevipennis* is reported to be endemic to the Cyclades (Kea, Andros, Tinos, Kithnos, Polýaigos, Episkopi, Naxos, Syros and Thira), the island of



**Fig. 13:** Distribution of *Anadrymadusa brevipennis* in Greece (● – literature records, ● – unconfirmed record from Iraklia).

Skiros and two isolated populations—Mt Ochi and Ochtonia—on the island of Evia (Willemse 1984; Willemse & Willemse 2008); other records from the Cyclades islands (Amorgos, Paros, Antiparos and Kato Koufonisi) are in need of confirmation. Nevertheless, Naskrecki and Ünal (1995) reported it from Hatay-Belen, in south-eastern Turkey after a single record mentioned in Karabağ *et al.* (1974). The species is also included in the Catalogue of the Turkish Orthoptera (Ünal 2011). *Anadrymadusa brevipennis* is considered vulnerable in the IUCN European Red list (Hochkirch *et al.* 2016).

#### 4. *Platycleis intermedia intermedia* (Serville, 1839)

(Fig. 14)

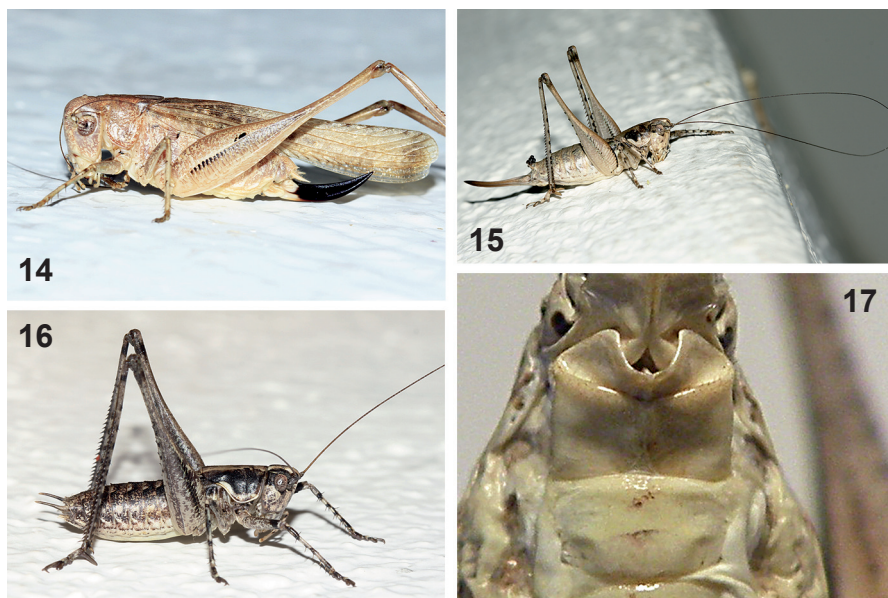
**Material examined:** viii.2015, 2♀.

This was the only member of the genus *Platycleis* Fieber, 1852 known from the Cyclades, until another species, *P. affinis affinis* Fieber, 1853, has been found recently on Andros (Alexiou 2017). *Platycleis i. intermedia* is widespread in mainland and insular Greece (Willemse 1984), but infrequently encountered in Iraklia.

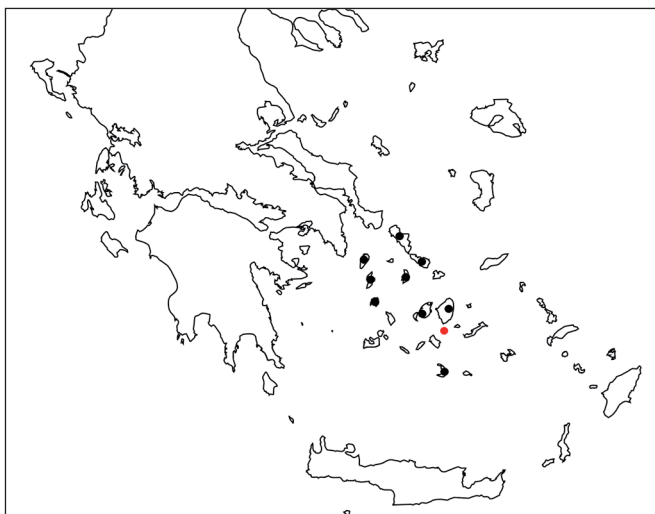
#### 5. *Rhacocleis insularis* (Ramme, 1928)

(Figs 15–18)

**Material examined:** viii.2015, 1♂, 3♀.



**Figs 14–17:** Orthoptera from Iraklia, Cyclades, Greece, viii.2015: (14) *Platycleis intermedia intermedia*, female; (15–17) *Rhacocleis insularis*, female (15), male (16), and ventral view of last abdominal sternites and subgenital plate of female (17).



**Fig. 18:** Total known distribution of *Rhacocleis insularis* (● – literature records, ● – new record from Iraklia).

Endemic to the Cyclades, *Rh. insularis* is known from several Aegean islands: Andros, Kithnos, Kea, Syros, Serifos, Tinos, Antiparos, Naxos and Santorini (Willemse & Willemse 2008; Fig. 18). It was frequently encountered in Iraklia.

#### 6. *Tettigonia viridissima* (Linnaeus, 1758)

(Fig. 19)

**Material examined:** 27.v.2016, 1♀.

The species is widely distributed throughout the Palearctic Region. It is widespread in insular and mainland Greece (Willemse 1984). All records from the



**Fig. 19:** *Tettigonia viridissima*, female, Iraklia, Cyclades, Greece, 27.v.2016.

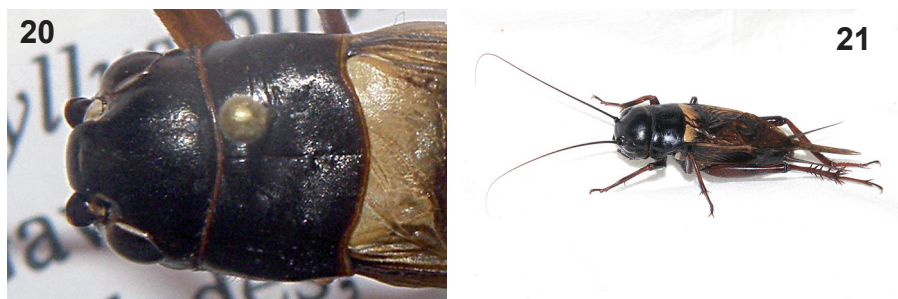


Cyclades islands are after Werner (1934) and include Kea, Syros, Milos, Mykonos, Andiparos, Folegandros and Ios (Werner 1934; Willemse 1984). Apparently rare in Iraklia, it was only once collected in a garden in the main settlement.

Superfamily Grylloidea  
 Family Gryllidae Laicharting, 1781  
 7. *Gryllus bimaculatus* De Geer, 1773  
 (Figs 20, 21)

**Material examined:** viii.2015, 1♀.

The species is widespread in Mediterranean Europe, tropical and subtropical regions of Asia and Africa. In Greece, it is scattered over the mainland and some of the islands. This is the second published record for the Cyclades archipelago after Astipalea (Willemse 1984), although there are unpublished observations from other islands as well (Alexiou, unpubl. data). The species is also recorded from the Aegean southern Sporades (Dodecanese archipelago) (Papapavlou 2005) as well as from the Turkish Aegean coast (Önder *et al.* 1999). It was frequently observed in Iraklia, especially around the port and on pebble beach. Locals misidentify it as a cockroach and persecute it.



**Figs 20, 21:** *Gryllus bimaculatus*, female, Iraklia, Cyclades, Greece, viii.2015: (20) head and pronotum; (21) dorsolateral view.

Family Mogoplistidae Brunner von Wattenwyl, 1873  
 8. *Arachnocephalus vestitus* Costa, 1855  
 (Figs 22, 23)

**Material examined:** x.2016, 2♂; xi. 2016, 1♂, 1♀.

As far as we know, this is a first record of this species for the Cyclades islands. This species has a circum-Mediterranean range and is scattered in mainland Greece, Crete and East Aegean islands (Willemse 1984). The species is also recorded from the northern Turkish Aegean coast (Silivri close to Istanbul) (Önder *et al.* 1999). It is easily overlooked due to the small size and its life cycle: it inhabits tree canopies and bushes and hardly ever moves on grasses and on the ground. It





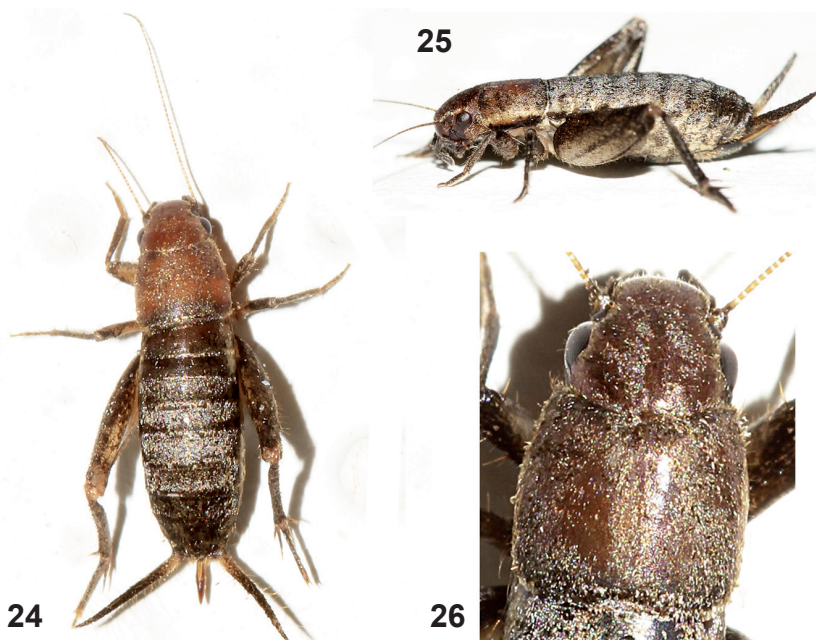
**Figs 22, 23:** *Arachnocephalus vestitus*, males, Iraklia, Cyclades, Greece: (22) 30.vii.2015, dorsolateral view; (23) 23.x.2015, dorsal view.

is probably common in Iraklia, yet with a cryptic way of life. *Arachnocephalus vestitus* was observed or collected on six occasions, all on a building wall, in the main settlement from July to November.

#### 9. *Mogoplistes brunneus* Serville, 1839

(Figs 24–27)

**Material examined:** 3.x.2015, 2♀; 4.xi.2016, 1♀; 5.xi.2016, 1♀; 13.xi.2016, 1♀; 20.xi.2016, 1♀.



**Figs 24–26:** *Mogoplistes brunneus*, females, Iraklia, Cyclades, Greece: (24) 6.x.2012, dorsal view; (25) 3.x.2015, dorsolateral view; (26) 3.x.2015, head and pronotum, dorsal view.



Fig. 27: Distribution of *Mogoplistes brunneus* in Greece (● – literature records, ● – new record from Iraklia).

*Mogoplistes brunneus* is considered a West Mediterranean species (Willemse 1984). According to Willemse (1984), two old records from Greece—one made from the Ionian island of Kerkira (Corfu) by Brunner von Wattenwyl in 1882 and the other from the island of Santorini (Thira) in the Cyclades by Dubrony in 1878—need confirmation. Kočárek and Vrabek (2005) on their collecting trips to Kerkira did not confirm the presence of the species on the island. More recently, Alexiou (2017) recorded the species from the island of Rhodes in south-eastern Aegean and Antonatos *et al.* (2008) from mainland Greece (Sterea Ellas, Attiki). The Iraklia records extend the range of *M. brunneus* into the central Aegean Sea. Our finding suggests that the species can be more widespread around the Aegean Area as well as the entire Greek mainland. To assess the range of the species, further field data are needed, especially during winter, when members of the genus seem to be more active. The absence of male specimens from Iraklia is intriguing, although probably accidental.

*Mogoplistes brunneus* has a cryptic way of life; two specimens were collected on a building wall at night in the village Agios Georgios, in October and November. One specimen was found under a stone in November in the vicinity of a wet gully called Vrissi, and the others were caught, during the same month, in a pitfall trap at Livadi, the seasonal wetland of the island.

The genus is represented in Greece with one more species, *M. kinzelbachi* Harz, 1976, described from Karpathos island, SE Aegean. *M. kinzelbachi* is known only from the type-material and has never been collected again (Harz 1976; Willemse 1984; Hollier & Bruckner 2015).

## Family Gryllotalpidae Saussure, 1870

10. *Gryllotalpa* cf. *krimbasi* Baccetti, 1992

(Fig. 28)

**Material examined:** xi. 2016, 1♂, 2 nymphs.

All specimens were collected at Livadi, the only seasonal wetland of the island, using pitfall traps.

Krimbas (1960) performed chromosome studies on *Gryllotalpa* specimens collected in Greece, showing that there are two sibling species with similar macroscopic appearance but different chromosome number,  $2n=14$  and  $2n=19$  respectively. Baccetti (1992) described the  $2n=19$  form as *Gryllotalpa kimbasi*.

Following Iorgu *et al.* (2016, 2017), *G. kimbasi* ( $2n=19$ ) is known from patches of mainland Greece (as far north as rivers Axios and Strimon), some Aegean islands as Kos and Rhodes and, most probably, also the Cyclades; it is speculated to be widespread in the Cyclades. The Greek populations with  $2n=14$  correspond to *G. stepposa* Zhantiev, 1991, a species from East Europe and West Asia, that reaches East Macedonia, Thraki and some East Aegean islands, like Lesvos and Samos. Iorgu *et al.* (2016, 2017) support that the two sibling species *G. stepposa* and *G. kimbasi* remain macroscopically indistinguishable, whereas the only reliable morphological difference between either of them and *G. gryllotalpa* is the appearance of the median vein in males. *G. gryllotalpa* (Linnaeus, 1753) is, however, excluded from the list of Greek Orthoptera (Willemse & Willemse 2008).

## Family Myrmecophilidae Saussure, 1874

11. *Myrmecophilus ochraceus* Fischer, 1853

(Fig. 29)

**Material examined:** 15.i.2015, 1♂; 2.ii.2016, 1♀. (determined by Th. Stalling)

*Myrmecophilus ochraceus* is a Mediterranean species, known from several localities in the mainland Greece and islands, including the nearby Naxos (Willemse 1984). It was observed and collected three times (January, February and October)



**Figs 28, 29:** Gryllotalpidae and Myrmecophilidae of Iraklia: (28) *Gryllotalpa* cf. *krimbasi*, male, xi.2016; (29) *Myrmecophilus ochraceus*, female, 2.ii.2016.

under stones, at the entrance of *Messor* ant nests. According to Th. Stalling (pers. comm. 4.ii.2016), the best time to collect members of genus *Myrmecophilus* Berthold, 1827 is ‘between October and April, when the ants are more active and the nests are close to the surface. From May to September it is often too hot and *Myrmecophilus* is more difficult to find’.

Superfamily Pyrgomorphoidea  
Family Pyrgomorphidae Brunner von Wattenwyl, 1874  
12. *Pyrgomorpha conica conica* (Olivier, 1791)

(Figs 30, 31)

**Material examined:** viii.2015, 1 nymph.

This Mediterranean species is very common in the Cyclades (Willemse 1984).

Superfamily Acridoidea  
Family Acrididae MacLeay, 1819  
13. *Calliptamus barbarus barbarus* (Costa, 1836)

(Figs 32, 33)

**Material examined:** viii.2015, 1♀.

This is a Mediterranean species, very common in Greece (Willemse 1984). It was a frequent encounter in Iraklia.



**Figs 30–33:** Pyrgomorphidae and Acrididae of Iraklia: (30, 31) *Pyrgomorpha conica conica*, pinned, viii.2015 (30) and alive, 13.v.2015 (31); (32, 33) *Calliptamus barbarus barbarus*, female, 27.xi.2014, pinned (32) and alive (33).



14. *Anacridium aegyptium* (Linnaeus, 1764)

(Fig. 34)

**Material examined:** viii.2015, observed and photographed.

This is a common species throughout Greece (Willemse 1984). It has been regularly observed in Iraklia.

15. *Acrida ungarica* (Herbst, 1768)

(Fig. 35)

**Material examined:** v.2016, 1 nymph.

This mainly Mediterranean species has so far been reported in the Cyclades from two western islands, Milos and Polýaigos (Willemse 1984). It was frequently observed in Iraklia.

16. *Acrotylus longipes* (Charpentier, 1845)

(Fig. 36)

**Material examined:** xi. 2016, 1♂.

The species has been regularly seen in Iraklia, mainly close to the seashore. Although it is found almost throughout Greece, it has apparently been a rare encounter in the Cyclades; this is the second record after Serifos (Willemse 1984).



**Figs 34–37:** Acrididae of Iraklia: (34) *Anacridium aegyptium*, 20.vii.2008; (35) *Acrida ungarica*, 17.ix.2008; (36) *Acrotylus longipes*, 29.i.2013; (37) *Acrotylus insubricus*, male, x.2016.



17. *Acrotylus insubricus* (Scopoli, 1786)

(Fig. 37)

**Material examined:** x.2016, 1♂.

The species inhabits large parts of West Palearctic and is common in Greece especially in sand dunes (Willemse 1984). In Iraklia it was collected from sand dunes in Livadi. This is the third record from the Cyclades after Milos and Serifos (Willemse 1984).

18. *Oedipoda caerulescens* (Linnaeus, 1758)

(Figs 38, 39)

**Material examined:** viii.2015, 3♂.

The species is common in Greece (Willemse 1984) and has been regularly observed in Iraklia.

19. *Sphingonotus* sp.

(Figs 40, 41)

**Material examined:** viii.2015, 1♂.

Members of the genus *Sphingonotus* Fieber, 1852 are common throughout mainland Greece and the islands. Given that the taxonomy of the genus is unclear



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**Figs 38–41:** Acrididae of Iraklia: (38) *Oedipoda caerulescens*, male, viii.2015, dorsally; (39) *Oe. caerulescens*, 7.x.2012, alive; (40) *Sphingonotus* sp., male, viii.2015, dorsally; (41) *Sphingonotus* sp., 30.xii.2013, alive.

(Willemse 1984), we do not attempt to identify the specimen to the species level. This grasshopper was an infrequent encounter in Iraklia.

20. *Chorthippus bornhalmi* Harz, 1971

(Figs 42, 43)

**Material examined:** viii.2015, 2♂, 2♀.

*Chorthippus* Fieber, 1852 with about 250 species is one of the most widespread acridid genera in the whole Holarctic Region. *Chorthippus bornhalmi* is common throughout mainland Greece and the islands, including the Cyclades (Willemse *et al.* 2009). This species has been regularly observed in Iraklia.



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**Figs 42, 43:** *Chorthippus bornhalmi*, Iraklia, Cyclades, Greece, 13.v.2015 (42) and viii.2015 (43).

#### DISCUSSION

The Orthoptera of Iraklia represent seven families, 19 genera and 20 species, i.e. about 5% of the Greek taxa as given in the latest published checklist (Willemse & Willemse 2008). Twelve taxa belong to Ensifera and eight to Caelifera. There are two Cyclades endemics (*Poecilimon paros* and *Rhacocleis insularis*) and one South Aegean endemic (*Acrometopa cretensis cretensis*). One species is of Balkan origin (*Gryllotalpa* cf. *krimbasi*), one is of Asian origin (*Anadrymadusa* cf. *brevipennis*) and the rest are more widespread taxa, either Mediterranean (*Arachnocephalus vestitus*, *Mogoplistes brunneus*, *Myrmecophilus ochraceus*, *Pyrgomorpha conica conica*, *Calliptamus barbarus barbarus*, *Acrida ungarica*, *Chorthippus bornhalmi*) or Palearctic (*Platycleis intermedia intermedia*, *Tettigonia viridissima*, *Gryllus bimaculatus*, *Anacridium aegyptium*, *Acrotylus longipes*, *Acrotylus insubricus*, *Oedipoda caerulescens*, *Sphingonotus* sp.).

In paleogeographical terms, we are tempted to think that the presence of the two Cyclades endemics, *Poecilimon paros* and *Rhacocleis insularis* on Iraklia is a consequence of its actual connection to the island of Naxos, Paros and Ios until

21 Kya or perhaps even more recently (Simaiakis *et al.* 2017). Further in the past, during the late Pleistocene, Iraklia is reported to have been part of a ‘mega-island’ (or ‘palaeo-Cyclades’) comprising several central Aegean islands currently known as Naxos, Ios, Paros, Antiparos, Andros, Folegandros, Giaros, Mykonos, Sikinos, Syros and Tinos; it was only around the onset of the Holocene (c. 12 Kya) that the southern part of this ‘mega-island’ was detached from the north part and the present morphology of the Cyclades was attained (Poulakakis *et al.* 2015; Geer van der *et al.* 2014; Kougioumoutzis *et al.* 2014). Thus, the two Cyclades endemics *Rhacocleis insularis* and *Poecilimon paros* may actually be considered as evidence of the paleogeographical connection of the island of Iraklia with other central Aegean islands.

#### ACKNOWLEDGEMENTS

Thomas Stalling (Inzlingen, Germany) kindly determined our *Myrmecophilus* specimens and made useful comments on the biology and habitat of the genus and Luc Willemse (Leiden, the Netherlands) offered fruitful comments on *Poecilimon paros*, as well as the related literature. We thank Dr Klaus-Gerhard Heller, Dr Bruno Massa and Dr Mike Mostovski for their helpful comments on earlier versions of this manuscript.

#### REFERENCES

- ALEXIOU, S. 2017. New distribution records of Orthoptera of Greece. *Journal of Orthoptera Research* **26** (1): 53–61.  
<https://doi.org/10.3897/jor.26.14541>
- ANTONATOS, S., TSAGARAKIS, A., EMMANUEL, N., ANAGNOSTOPOULOS, A. & NTAMPAKIS, D. 2008. Records and seasonal variation of Orthoptera species in a flat and mountainous area in Attica [Παρουσία και εποχιακή διακύμανση Ορθοπτερών σε πεδινή και ορεινή περιοχή του Νομού Αττικής]. *Proceedings of the 6th Panhellenic Rangeland Congress* (2–4 October 2008) in *Leonidio Arcadia Peloponnesus*. Thessaloniki, pp. 275–280. [in Greek, with English summary].
- ANTONOPOULOS, Z., GAVALAS, G. & KREUTZ, K. 2010. The orchids of the Aegean island of Herakleia (Cyclades) and *Ophrys heracleotica* Gavalas, Kreutz & Antonopoulos, a new *Ophrys* species. *Berichte aus den Arbeitskreis Heimische Orchideen* **27** (2): 266–281.
- BACCETTI, B. 1992. Notulae Orthopterologicae. 50. Su alcuni ortotteroidei del Mediterraneo orientale. *Fragmenta Entomologica* **23** (2): 247–276.
- CIGLIANO, M.M., BRAUN, H., EADES, D.C. & OTTE, D. 2016. *Orthoptera Species File*. Version 5.0/5.0. <http://Orthoptera.SpeciesFile.org> (accessed November 2016).
- EUNIS. 2017. *Mikres Kyklades: Irakleia, Schoinoussa, Koufonisia, Keros, Antikeria kai thalassia zoni*. <http://eunis.eea.europa.eu/sites/GR4220013> (accessed 17 January 2017).
- GAVALAS, G. 2013. *Butterflies of Iraklia*. Wild Greece Editions, Athens. 67 pp. [in Greek]
- 2014. *Flying over the Aegean, a guide to the birds of Iraklia and the nearby islets*. Wild Greece Editions, Athens. 132 pp.
- GAVALAS, G. & ALEXIOU, S. 2015. Butterflies (Lepidoptera: Papilionoidea & Hesperioidea) of the Greek central Aegean Island of Iraklia, and a synopsis of the taxa recorded from the nearby islands of Paros, Naxos, Ios and Amorgos. *Parnassiana Archives* **3**: 25–36.  
<http://wildgreeceeditions.com/images/Butterflies%20of%20Iraklia.pdf>
- GEER VAN DER, A.A.E., LYRAS, G.A., HOEK OSTENDE VAN DER, L.W., VOS DE, J. & DRINIA, H. 2014. A dwarf elephant and a rock mouse on Naxos (Cyclades, Greece) with a revision of the palaeozoogeography of the Cycladic Islands (Greece) during the Pleistocene. *Palaeogeography, Palaeoclimatology, Palaeoecology* **404**: 133–144.  
<https://doi.org/10.1016/j.palaeo.2014.04.003>

- HARZ, K. 1976. Orthopterologische Beiträge XV. *Nachrichtenblatt der Bayerischen Entomologen* **25**: 54–58.
- HELLER, K.-G. & REINHOLD, K. 1992. A new bushcricket of the genus *Poecilimon* from the Greek islands (Orthoptera: Phaneropterinae). *Tijdschrift voor Entomologie* **135**: 163–168.
- HELLER, K.-G., WILLEMSE, L., ODE, B., VOLLETH, M., FEIST, R. & REINHOLD, K. 2011. Bioacoustics and systematics of the *Poecilimon hamatus* group (Tettigoniidea: Phaneropteridae: *Poecilimon*: *Hamatopoecilimon* n. subg.). *Journal of Orthoptera Research* **20** (1): 81–95.
- HOCHKIRCH, A., NIETO, A., GARCÍA CRIADO, M., CÁLIX, M., BRAUD, Y., BUZZETTI, F.M., CHOBANOV, D., ODE, B., PRESA ASENSIO, J.J., WILLEMSE, L., ZUNA-KRATKY, J., BARRANCO VEGA, P., BUSHELL, M., CLEMENTE, M.E., CORREAS, J.R., DUSOULIER, F., FERREIRA, S., FONTANA, P., GARCÍA, M.D., HELLER, K.-G., IORGU, I.S., IVKOVIĆ, S., KATI, V., KLEUKERS, R., KRISTIN, A., LEMONNIER-DARCEMONT, M., LEMOS, P., MASSA, B., MONNERAT, C., PAPAPAVLOU, K.P., PRUNIER, F., PUSHKAR, T., ROESTI, C., RUTSCHMANN, F., ŞIRIN, D., SKEJO, T., SZÖVÉNYI, G., TZIRKALLI, E., VEDEMINA, V., BARAT DOMENECH, J., BARROS, F., CORDERO TAPIA, P.J., DEFAUT, B., FARTMANN, T., GOMBOC, S., GUTIÉRREZ-RODRÍGUEZ, J., HOLUŠA, J., ILLICH, I., KARJALAINEN, S., KOČÁREK, P., KORSUNOVSKAYA, O., LIANA, A., LÓPEZ, H., MORIN, D., OLMO-VIDAL, J.M., PUSKÁS, G., SAVITSKY, V., STALLING, T. & TUMBRINCK, J. 2016. *European Red List of grasshoppers, crickets and bush-crickets*. Publications Office of the European Union, Luxembourg.
- HOLLIER, J. & BRUCKNER, H. 2015. An annotated list of the orthopteroid insects described by Kurt Harz, with an account of the type specimens held in the Muséum d'histoire naturelle de Genève. *Revue suisse de Zoologie* **122** (2): 185–200.
- IORGU, I.S., IORGU, E.I., PUSKÁS, G., IVKOVIĆ, S., BORISOV, S., GAVRILS, V.D. & CHOBANOV, D.P. 2016. Geographic distribution of *Gryllotalpa stepposa* in south-eastern Europe, with first records for Romania, Hungary and Serbia (Insecta, Orthoptera, Gryllotalpidae). *ZooKeys* **605**: 73–82.  
doi:10.3897/zookeys.605.8804
- 2017. Corrigenda: Geographic distribution of *Gryllotalpa stepposa* in south-eastern Europe, with first records for Romania, Hungary and Serbia (Insecta, Orthoptera, Gryllotalpidae). *ZooKeys* **605**: 73–82, doi:10.3897/zookeys.605.8804 *ZooKeys* **671**: 155–156.  
<https://doi.org/10.3897/zookeys.671.13116>
- KARABAĞ, T. 1961. Revision of *Drymadusa* Stein and related genera (Orthoptera: Tettigoniidae). *Bulletin of the British Museum (National History)* **11** (1): 1–41.
- KARABAĞ, T., GÜMÜŞSUYU, İ., BALAMIR, S. & TUTKUN, E. 1974. Türkiye Orthoptera faunası'nın tesbiti üzerinde araştırmalar (II). *Bitki Koruma Bülteni [Plant protection newsletter]* **14** (1): 3–18.  
<http://bitkikorumabulteni.gov.tr/index.php/bitki/article/viewFile/896/872> (accessed 24 July 2017)
- KOČÁREK, P. & VRABEK, V. 2005. Contribution to the knowledge of orthopteroid insects of Corfu Island, Greece (Orthoptera, Mantodea, Dermaptera, Blattaria, Isoptera). *Entomofauna carpathica* **17**: 6–8.  
[http://www1.osu.cz/orthoptera/kocarek/pdfs/Kocarek,Vrabec\\_2005.pdf](http://www1.osu.cz/orthoptera/kocarek/pdfs/Kocarek,Vrabec_2005.pdf)
- KOUGIOUMOUTZIS, K., SIMAIKIS, S.M. & TINIAKOU, A. 2014. Network biogeographical analysis of the central Aegean archipelago. *Journal of Biogeography* **41**: 1848–1858.  
<https://doi.org/10.1111/jbi.12342>
- KRIMBAS, K. 1960. Sibling *Gryllotalpa* species in Greece: cellular and morphological research [Τα δίδυμα είδη *Gryllotalpa* εν Ελλάδι, κυταρολογική και μορφολογική έρευνα]. Report to the Ministry of Agriculture, Athens, Greece. 27 pp.
- NASKRECKI, P. & ÜNAL, M. 1995. The Orthoptera of Hatay province, S. Turkey. *Beiträge zur Entomologie* **45** (2): 393–419.
- ÖNDER, F., PEHLIVAN, E., KARSAVURAN, Y., TEZCAN, S. & KISMALI, Ş. 1999. Catalogue of the collection of Gryllidae and Gryllotalpidae (Orthoptera) preserved in the Prof. Niyazi Lodos Museum, Izmir, Turkey. *Türkiye Entomoloji Dergisi* **23** (2): 83–90.
- PAPAPAVLOU, K. 2005. New distributional data on the Orthoptera (Saltatoria) of the northern Dodecanese (“Southern Sporadhes”) archipelago, Greece. *Graellsia* **61** (1): 3–11.
- POULAKAKIS, N., KAPLI, P., LYMBERAKIS, P., TRICHAS, A., VARDINOYIANNIS, K., SFENTHOURAKIS, S. & MYLONAS, M. 2015. A review of phylogeographic analyses of animal taxa from the Aegean

- and surrounding regions. *Journal of Zoological Systematics and Evolutionary Research* **53** (1): 18–32.  
<https://doi.org/10.1111/jzs.12071>
- SIMAIAKIS, M.S., RIJSDIJK, K.F., KOENE, E.F.M., NORDER, S.J., VAN BOXEL, J.H., STOCCHI, P., HAMMOUD, C., KOUGIOUMOUTZIS, K., GEORGOPOULOU, E., VAN LOON, E., TJØRVE, K.M.C & TJØRVE, E. 2017. Geographic changes in the Aegean Sea since the Last Glacial Maximum: Postulating biogeographic effects of sea-level rise on islands. *Palaeogeography, Palaeoclimatology, Palaeoecology* **471**: 108–119.  
<https://doi.org/10.1016/j.palaeo.2017.02.002>
- ÜNAL, M. 2011. Turkish Orthoptera Site (TOS).  
<http://www.orthoptera-tr.org/index.php/check-list-of-the-turkish-orthoptera> (accessed 1 November 2016)
- WERNER, F. 1934. Dritter Beitrag zur Kenntnis der Tierwelt des Ägäischen Inseln. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften Mathematisch-Naturwissenschaftliche Classe, Abt. I* **143**: 313–337.
- WILLEMSE, F. 1979. A review of the species of *Acrometopa* Fieber, 1853 (Orthoptera, Tettigonioidea, Phaneropterinae) with special reference to the Greek fauna. *Bijdragen tot de Dierkunde* **49** (1): 135–152.
- 1984. *Catalogue of the Orthoptera of Greece*. In: *Fauna Graeciae*. Vol. 1. Hellenic Zoological Society, Athens. 275 pp.
- 1985a. Supplementary notes on the Orthoptera of Greece. In: *Fauna Graeciae*. Vol. 1a. Hellenic Zoological Society, Athens. 47 pp.
- 1985b. *A key to the Orthoptera species of Greece*. In: *Fauna Graeciae*. Vol. 2. Hellenic Zoological Society, Athens. 288 pp.
- WILLEMSE, F., VON HELVERSEN, O. & ODÉ, B. 2009. A review of *Chorthippus* species with angled pronotal lateral keels from Greece with special reference to transitional populations between some Peloponnesian taxa (Orthoptera, Acrididae). *Zoologische Mededelingen Leiden* **83** (2): 319–507.  
<http://www.zoologischemededelingen.nl/83/nr02/a02> (accessed 23 July 2017)
- WILLEMSE, F. & WILLEMSE, L. 2008. An annotated checklist of the Orthoptera-Saltatoria from Greece including [sic] an updated bibliography. *Articulata Beiheft* **13**: 1–91.



